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A Test of the Cognitive Model of Negative Symptoms: Associations Between Defeatist Performance Beliefs, Self-Efficacy Beliefs, and Negative Symptoms in a Non-Clinical Sample

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Highlights

- Links tested among defeatist performance and self-efficacy beliefs and negative symptoms
- There was a medium-sized, inverse correlation between the belief types
- Both beliefs correlated with negative symptoms; defeatist performance beliefs link was stronger
- These two belief types seem to be distinct but overlapping constructs
- Defeatist performance beliefs may have a greater role in negative symptoms

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Abstract

The cognitive model of negative symptoms posits that defeatist performance beliefs—overgeneralized negative beliefs about one's ability to successfully perform tasks—contribute to the development and maintenance of negative symptoms. However, a conceptually similar construct, reduced generalized self-efficacy—diminished confidence in one's ability to effectively complete or respond to new or challenging tasks and situations—has also been linked to negative symptoms. To identify which beliefs might be most important to target to reduce negative symptoms, we examined: 1) the association between defeatist performance and self-efficacy beliefs and 2) which beliefs are more strongly associated with negative symptoms in a non-clinical sample of young adults (N = 941). Analyses revealed a significant, medium-sized correlation between defeatist performance and self-efficacy beliefs. Both beliefs types were significantly associated with negative symptoms, but defeatist performance beliefs were more strongly related to negative symptoms than self-efficacy beliefs. Defeatist performance and self-efficacy beliefs appear to be distinct, yet overlapping constructs. Findings support the cognitive model and indicate that defeatist performance beliefs may have a greater role in the manifestation of negative symptoms than self-efficacy beliefs. Thus, defeatist performance beliefs may be a uniquely promising treatment target for reducing or preventing negative symptoms.

Keywords: negative symptoms; defeatist beliefs; schizotypy; schizophrenia; cognitive model

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1. Introduction

Negative symptoms, such as blunted affect and asociality, are prevalent in people with schizophrenia-spectrum disorders (Bobes et al., 2010). These symptoms have been identified in individuals at various junctures on the spectrum, including those with schizotypy—the 10% of the population exhibiting traits reflecting a putative genetic liability for schizophrenia (Lenzenweger and Korfine, 1992; Meehl, 1962, 1990). Negative symptoms are also strongly linked to reduced functional outcomes and quality of life in schizophrenia-spectrum populations (Cohen and Davis, 2009; Fervaha et al., 2014; Grant and Beck, 2009). However, extant pharmacological treatments have demonstrated little effectiveness in ameliorating these symptoms (Tandon et al., 2010). Accordingly, researchers have worked to identify novel factors that may be targeted in psychosocial treatments to improve negative symptoms in those with schizophrenia.

According to the cognitive model of negative symptoms, defeatist beliefs such as defeatist performance beliefs—overgeneralized negative beliefs about one's ability to successfully perform tasks (Grant and Beck, 2009)—are key psychological factors that lead to the development and maintenance of negative symptoms (Beck et al., 2009). Specifically, the model posits that people with a vulnerability to developing schizophrenia have neurocognitive problems and related difficulties that contribute to reduced performance in areas such as school, work, or social relationships. These discouraging experiences can lead to the formation of

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defeatist beliefs about one's performance (i.e., "It is not worth trying because I will only fail."), which can contribute to reductions in motivation and engagement in goal-directed or enjoyable activities. Further, this withdrawal from tasks can also act as a maladaptive behavior to prevent expected poor performance or failure; by limiting experiences to counter negative beliefs about one's abilities, defeatist beliefs are strengthened (Couture et al., 2011; Perivoliotis et al., 2009). As a result, for some people, this cycle results in the development of negative symptoms, further contributing to reduced functioning.

Empirical support for the cognitive model comes from both cross-sectional and longitudinal studies. To date, several studies have found small to large cross-sectional associations between increased defeatist performance beliefs and negative symptoms both in those diagnosed with schizophrenia (see Campellone et al., 2016 for a review; Couture et al., 2011; Grant and Beck, 2009) and those with schizotypy (Fervaha et al., 2015; Luther et al., 2016). Importantly, the relationship between defeatist performance beliefs and negative symptoms has been found to be independent of depression symptoms (Grant and Beck, 2009; Fervaha et al., 2015). Similarly, several studies have found that greater defeatist performance beliefs are related to reduced functioning and quality of life across the schizophrenia-spectrum (Grant and Beck, 2009; Luther et al., 2016; Pillny and Lincoln, 2017). Studies have also found that compared to controls, defeatist performance beliefs are elevated in individuals with schizotypy (Luther et al., 2016), those at ultra-high risk of developing schizophrenia (Perivoliotis et al., 2009), those with recent-onset schizophrenia (Ventura et al., 2014), and those with more prolonged schizophrenia (Grant and Beck, 2009; Horan et al., 2010; Kiwanuka et al., 2014), supporting the validity of the cognitive model. Longitudinal studies have also largely corroborated these cross-sectional findings by demonstrating links between reduced defeatist

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beliefs and lower prospective negative symptoms and greater time in social and occupational activities (Luther et al., 2015; Thomas et al., 2017). Taken together, these studies suggest that defeatist performance beliefs are an important psychological factor that contributes to both the development and maintenance of negative symptoms and reduced functioning.

Although the cognitive model specifies that different subtypes of defeatist beliefs and expectancies may lead to the development of negative symptoms (Beck et al., 2009), most studies to date have focused on defeatist performance beliefs. However, a putatively related concept, reduced generalized self-efficacy—diminished confidence in one's ability to effectively complete or respond to new or challenging tasks and situations (Schwarzer and Jerusalem, 1995)—may also play a role in negative symptoms. Indeed, self-efficacy has been posited to be a key factor for successful task performance, persistence, and completion (Bandura, 1977, 1997; Luszczynska, Gutiérrez-Doña, et al., 2005). To date, among people with schizophrenia, researchers have found that compared to controls, self-efficacy is reduced in people with early (Ventura et al., 2014) and relatively prolonged schizophrenia (Bentall et al., 2010; Lincoln et al., 2014). However, it is unclear if these beliefs are reduced in those with schizotypy. In addition, small to large correlations between greater self-efficacy and lower negative symptoms have been found in a sample of people with schizophrenia-spectrum disorders as well as in a college student sample (Avery et al., 2009; Kurtz et al., 2013; Ventura et al., 2014, Wolfradt et al., 1999). Finally, some studies have also observed that lower self-efficacy is related to reduced quality of life and psychosocial functioning in people with schizophrenia-spectrum disorders (Cardenas et al., 2013; Hill and Startup, 2013; Pratt et al., 2005).

Several key questions regarding defeatist performance beliefs and self-efficacy emerge given that they are conceptually similar, both types of beliefs have been linked with negative

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symptoms, and both belief types are often impaired in people diagnosed with schizophrenia-spectrum disorders. First, it is unclear what the magnitude of the relationship is between these two beliefs. Elucidating the overlap between these constructs will help to disentangle whether we are assessing overlapping or distinct constructs, which could have clinical implications (e.g., should they be independent treatment targets?). Similarly, it is also unclear which type of belief is more strongly related to negative symptoms. Identifying which beliefs are more strongly related to subclinical negative symptoms[1] (i.e., negative schizotypy traits) may help researchers and clinicians to determine what type of thought content is specific to negative symptoms (i.e., cognitive content-specificity hypothesis; Beck, 1976) and identify beliefs that may be most important to target in efforts to reduce or prevent the development of more severe negative symptoms. Finally, although both increased defeatist performance beliefs and reduced self-efficacy beliefs have been found in those with schizophrenia-spectrum disorder diagnoses in several studies (cf., Grant and Beck, 2009; Ventura et al., 2014), no studies to our knowledge have examined whether self-efficacy is reduced, and only one study has examined if defeatist performance beliefs are increased in those with schizotypy. Ascertaining whether those with a putative liability for schizophrenia have greater defeatist performance beliefs and reduced self-efficacy beliefs can help to identify whether these belief alterations are enduring aspects of the schizophrenia-spectrum, which can inform identification and early intervention efforts.

To investigate these questions, we examined the relationships between defeatist performance beliefs, self-efficacy beliefs, and negative symptoms in a sample from a non-clinical setting. Examining these relationships in a non-clinical sample helps to ensure that any identified relationships are independent of potential confounds seen in clinical samples, such as

[1] Recognizing that someone may have a symptom of a disorder without being diagnosed or clinically treated, we have retained the simpler term “symptom” throughout.

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medication effects, hospitalizations, and stigma, which are more prevalent in studies of people who have had psychosis for a prolonged period (Gooding et al., 2005; Cohen et al., 2015). Based on conceptual similarities, we hypothesized that there would be a medium-sized, inverse relationship between self-efficacy and defeatist performance beliefs. Since the cognitive model posits that defeatist performance beliefs specifically are related to the development of negative symptoms (Beck et al., 2009), we hypothesized that these beliefs would be more strongly related to negative symptoms compared to self-efficacy beliefs. If these hypotheses were supported, we planned to conduct two additional analyses to further understand the relationships between these beliefs and negative symptoms; 1) to ensure that the relationship between defeatist performance beliefs and negative symptoms was independent of self-efficacy beliefs, we conducted a partial correlation controlling for self-efficacy; 2) to identify whether defeatist performance beliefs was an intervening variable in the relationship between self-efficacy and negative symptoms, we conducted a mediation analysis.

To further characterize these beliefs, we also conducted several secondary analyses. First, because past work has linked defeatist performance beliefs and depression symptoms (Grant and Beck, 2009; Fervaha et al., 2015), we examined whether the relationship between defeatist performance and self-efficacy beliefs would be independent of depression symptoms. We hypothesized that the relationship between both defeatist performance and self-efficacy beliefs and negative symptoms would remain significant after controlling for depression symptoms. Second, we explored whether defeatist performance or self-efficacy beliefs were more strongly related to quality of life and depression as well as positive and disorganized symptoms. Finally, defeatist performance beliefs have been found to be increased in people with schizotypy compared to those without schizotypy (Luther et al., 2016); however, reductions in self-efficacy

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have yet to be established in a schizotypy sample. Thus, we aimed to both replicate the previously observed elevation of defeatist performance beliefs in the schizotypy sample and determine whether self-efficacy beliefs were also reduced in those with schizotypy compared to those without schizotypy.

2. Methods

2.1 Participants and procedure

Participants were undergraduate students from a large mid-western university in the United States who self-selected to complete the current study for course research credit. As part of informed consent, participants were told that they would complete an anonymous survey consisting of various measures of attitudes, symptoms, and functioning, with the primary goal of the study being to better understand the relationships between these domains in university students. Over the course of approximately four semesters,1,025 participants completed the survey. To identify those who provided random or invalid responses, we embedded ten items from the Chapman Infrequency Scale (Chapman and Chapman, 1983) in the survey. Following prior studies (Cohen and Davis, 2009; Minor et al., 2018), we used an abbreviated version of the scale to reduce participant burden. This scale includes items such as "I find that I often walk with a limp, which is the result of a skydiving accident." Participants (n = 84) were excluded if they endorsed (e.g., agreed or strongly agreed with) more than two items, which resulted in a final sample of 941 participants. Demographic characteristics of the included participants are displayed in Table 1. All procedures were approved by the institutional review board at Indiana University—Purdue University Indianapolis.

2.2. Measures

2.2.1. Schizotypy traits

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In order to assess for positive, negative, and disorganized symptoms and to identify participants with and without schizotypy, we used the Schizotypal Personality Questionnaire-Brief Revised (SPQ-BR; Cohen et al., 2010). The SPQ-BR consists of 32 self-report items, and participants were asked to rate each item on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Items can be divided into positive (ideas of references, odd beliefs or magical thinking, suspiciousness, and unusual perceptual experiences items), negative (no close friends and constricted affect items), and disorganized (odd speech and odd or eccentric behavior items) symptom factors. A sample item from the negative factor is "I find it hard to be emotionally close to other people." Greater scores on each factor and the total score are indicative of higher symptoms, and score ranges are as follows: positive factor (14-70), negative factor (6-30), disorganized factor (8-40), and total score (32-160). Scores on the SPQ-BR have shown adequate content and convergent validity as well as good internal consistency in college samples (Callaway et al., 2014; Cohen et al., 2010). Scores for the SPQ-BR total score and factors demonstrated good to excellent internal consistency in the present sample (α's range = 0.80 to 0.92).

2.2.2. Defeatist performance beliefs

The defeatist performance beliefs subscale (Grant and Beck, 2009) of the Dysfunctional Attitudes Scale (DAS; Weissman, 1978) was used to assess defeatist performance beliefs. The subscale consists of 15 self-report items that are rated on a 7-point Likert scale, ranging from 1 (*agree totally*) to 7 (*disagree totally*). A sample item is "If you cannot do something well, there is little point in doing it at all." Scores are coded so that a higher score reflects increased defeatist performance beliefs, and total scores range from 15 to 105. Consistent with prior studies with

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college students (Cane et al., 1986; Fervaha et al., 2015; Luther et al., 2015), the subscale demonstrated excellent internal consistency (α = 0.90).

2.2.3. Self-efficacy beliefs

The Generalized Self-Efficacy Scale (Schwarzer and Jerusalem, 1995) was used to determine participants' global level of self-efficacy. This was chosen over more domain or task-specific self-efficacy measures because defeatist performance beliefs are also not domain or task-specific. The Generalized Self-Efficacy Scale assesses a person's confidence in his/her ability to effectively complete or respond to new or challenging situations and associated obstacles. It assesses a broad sense of a person's perceived competence to effectively complete or deal effectively with a range of challenging or demanding tasks. The scale involves 10 self-report items that are rated on a 4-point Likert Scale ranging from 1 (*not at all true*) to 4 (*exactly true*). A sample item is "I can always manage to solve difficult problems if I try hard enough." Total scores range from 10 to 40, and higher scores indicate stronger self-efficacy. This measure has shown acceptable construct validity, test-retest reliability, and internal consistency (Leganger et al., 2000; Schwarzer et al., 1999) in a range of samples, including college students (Schwarzer et al., 1997; Zhang and Schwarzer, 1995). Internal consistency in the present sample was good (α = 0.85).

2.2.4. Depression symptoms

The depression module of the Patient Health Questionnaire (PHQ; Spitzer et al., 1999; Kroenke et al., 2001) was used to assess depression symptoms. This 9-item measure, known as the PHQ-9 (Kroenke et al., 2001), consists of self-reported depression symptoms that are rated on a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*). A sample symptom is "Feeling bad about yourself—or that you are a failure or have let yourself or your family down." Total scores range from 0 to 27, and higher scores indicate greater depression symptom

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severity. The PHQ-9 has demonstrated excellent test-retest reliability, construct validity, and criterion validity (Kroenke et al., 2001) and has been used with college student samples (Eisenberg et al., 2007; Granillo, 2012). The PHQ-9 score demonstrated good internal consistency in the present sample ($\alpha = 0.89$).

2.2.5. Quality of life

Quality of life (QOL) was assessed using the self-report Lehman Quality of Life Questionnaire TL-30 (Lehman, 1996), which assesses similar domains as Lehman's Quality of Life Interview—Brief Version (Lehman et al., 1995). The TL-30 contains 30 items and assesses both subjective and objective QOL across the following domains: living situation, daily activities, family and social relationships, finances, health, and safety. The objective items are rated on variable response scales and assess frequency of behaviors (e.g., "How often do you talk to a member of your family on the telephone?") or access to different resources (e.g., In the past month, did you have enough money for housing?). The subjective items (e.g., "Select the item that best describes how you feel about the amount of friendship in your life.") are rated on a 7-point satisfaction scale ranging from 1 (*terrible*) to 7 (*delighted*), with the mean total score for the subjective QOL subscale also ranging from 1 to 7. Items are scored such that higher scores suggest greater QOL. The TL-30 has shown good convergent validity and test-retest reliability (Nørholm and Bech, 2007; Cohen et al., 2010) and similar versions of the questionnaire have been used with college students (Cohen and Davis, 2009; Cohen et al., 2010). In the current sample, internal consistency was good for the QOL subjective subscale ($\alpha = 0.82$) but was poor for the objective subscale ($\alpha = 0.42$). Consequently, we only used the subjective QOL subscale in further analyses.

2.3. *Analyses*

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Analyses were conducted in several steps. First, we conducted descriptive statistics to characterize the sample and ensure that the data adhered to statistical assumptions. Next, we conducted a Pearson's correlation in the entire sample to test our hypothesis that there would be a significant and medium-sized relationship between defeatist performance beliefs and self-efficacy beliefs. We also used the coefficient of determination (r^2) to identify the amount of overlapping and non-overlapping variance between these two beliefs. To test our hypothesis that defeatist performance beliefs were more strongly related to negative symptoms than self-efficacy beliefs, we used Fisher's *r*-to-*z* transformations to compare the magnitude of the correlations between the two beliefs and negative symptoms. Once these hypotheses were supported, we then examined whether the relationship between defeatist performance beliefs and negative symptoms was independent of self-efficacy beliefs by conducting a partial correlation controlling for self-efficacy. We also examined whether defeatist performance beliefs was a significant mediator between self-efficacy beliefs and negative symptoms using the PROCESS macro (Hayes, 2013). To test for mediation, we examined the indirect effect (*ab*) of self-efficacy beliefs on negative symptoms through defeatist performance beliefs by conducting two ordinary least square regressions within the macro: 1) to obtain a, defeatist performance beliefs was regressed onto self-efficacy beliefs; 2) negative symptoms were then regressed onto both defeatist performance beliefs (produces *b*) and self-efficacy beliefs (produces *c'*, which is the direct effect of self-efficacy on negative symptoms independent of the pathway through defeatist performance beliefs). We used a 95% bias-corrected bootstrap confidence interval based on 10,000 bootstrap samples for the indirect effect; significant mediation is indicated if the confidence interval does not include zero (Hayes, 2013).

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To test our secondary hypothesis that the relationship between both beliefs and negative symptoms would be independent of depression symptoms, we conducted partial correlations controlling for depression symptoms. For exploratory analyses, we conducted Pearson's correlations to explore the relationships between both defeatist performance beliefs and self-efficacy beliefs and symptoms (positive, disorganized, and depression symptoms) and subjective QOL. To explore which beliefs (defeatist performance beliefs or self-efficacy beliefs) were more strongly related to these symptoms and QOL, we used Fisher's *r*-to-*z* transformations. For all correlations, we interpreted the magnitude based on Cohen's (1992) recommendation for correlations where 0.10 is small, 0.30 is medium, and 0.50 is large. To account for the multiple comparisons, we used the Bonferroni correction, resulting in a significance level of $p < .003$ (.05/15 total correlations) for all correlations.

Finally, we used two independent samples *t*-tests to test our hypothesis that defeatist performance beliefs would be increased and self-efficacy beliefs would be reduced in those with schizotypy (> 1.65 standard deviations (95^{th} percentile) above the mean of the total SPQ-BR score) compared to those without schizotypy (< 1.65 standard deviations on the mean of the total SPQ-BR score). Following prior procedures (Cohen et al., 2012; Minor et al., 2015), the schizotypy and non-schizotypy groups were identified after controlling for gender and ethnicity. Based on evidence indicating that schizotypy has a population prevalence of about 10% (Lenzenweger, 2006; Meehl, 1962), we followed Cohen et al. (2012) and Minor et al. (2015) and adopted a conservative approach of including only the top 5% of scorers in the schizotypy group in attempts to reduce false positives. Finally, we calculated Cohen's *d* as a measure of effect size and followed Cohen (1992) in categorizing effect sizes of 0.2 as small, 0.5 as medium, and 0.8 as large.

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3. Results

3.1 *Measure descriptives*

Measure descriptives are in Table 1. Notably, the three mean SPQ-BR subscale scores all suggested that on average, participants responded to symptom experience items with either disagree or neutral. Similarly, the mean belief scores indicated that on average, participants slightly disagreed with the defeatist performance beliefs items and indicated that the self-efficacy statements were moderately true.

3.2. Correlations with defeatist performance and self-efficacy beliefs

Consistent with our hypothesis, defeatist performance beliefs were significantly and inversely related to self-efficacy beliefs (r = -0.31, p < .001), showing a medium correlation. Notably, the coefficient of determination indicated that these beliefs only share 9.61% of underlying variance, while 90.39% of the variance in each belief is not accounted for by the other belief. In addition, greater defeatist performance beliefs and lower self-efficacy beliefs were also significantly related to increased negative symptoms. The magnitude of the relationship between negative symptoms and defeatist performance beliefs was medium (r = 0.43, p < 0.001), while the relationship between negative symptoms and self-efficacy was small (r = -0.26, p < 0.001); both relationships remained significant after controlling for depression (see Table 2). As hypothesized, defeatist performance beliefs were more strongly related to negative symptoms than self-efficacy beliefs (Z = 4.20, p < 0.001), and the difference remained significant after controlling for depression symptoms (Z = 3.88, p < 0.001).

Given that our hypotheses were supported, we also conducted additional partial correlations (as well as a mediation analysis; see below). The relationship between defeatist performance beliefs and negative symptoms remained significant when controlling for self-efficacy (r = .38, p < .001). We explored whether this was also true with self-efficacy and

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negative symptoms, finding that the relationship between self-efficacy and negative symptoms remained significant when controlling for defeatist performance beliefs (r = -.14, p < .001).

In additional exploratory analyses, higher defeatist performance beliefs and lower self-efficacy beliefs were significantly related to greater positive and disorganized symptoms, greater depression symptoms, and lower subjective QOL (see Table 2). When we compared the magnitude of these correlations, defeatist performance beliefs were more strongly related to positive and disorganized symptoms and depression symptoms than self-efficacy beliefs. The magnitude of the correlations between the two beliefs and QOL did not statistically differ.

3.3. Defeatist performance beliefs as a mediator

Mediation results are reported in Table 3 and Figure 1. Defeatist performance beliefs significantly mediated the relationship between self-efficacy beliefs and negative symptoms. Specifically, those who had reduced self-efficacy beliefs also reported greater defeatist performance beliefs (a = -1.09, p < .001), which in turn led to increased negative symptoms (b = .13, p < .001). The 95% bias-corrected bootstrap confidence interval for the indirect effect (ab = -.14) did not include zero [-.18, -.11], indicating significant mediation. After accounting for the defeatist performance beliefs pathway, there was also a significant direct effect of self-efficacy beliefs on negative symptoms (c' = -.16, p < .001).

3.4.. Group differences on defeatist performance and self-efficacy beliefs

As hypothesized, the schizotypy group (n = 44) reported significantly more defeatist performance beliefs (M = 56.7, SD = 17.2, p < .001) and less self-efficacy beliefs (M = 28.6, SD = 4.6, p < .001) compared to the non-schizotypy group (n = 58) (defeatist, M = 30.0 SD = 10.1; self-efficacy, M = 33.1 SD = 3.9). Both of these effect sizes were large (defeatist, d = 1.89; self-efficacy, d = -1.06).

4. Discussion

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Efforts to treat the negative symptoms of schizophrenia have led to interest in the identification of psychological treatment targets. Informed by the cognitive model of negative symptoms (Beck et al., 2009), the primary aim of this study was to examine the magnitude of the overlap between two types of beliefs, defeatist performance and self-efficacy beliefs, as well as their association with negative symptoms in a sample from a non-clinical setting. In line with our hypothesis, we observed a significant, inverse relationship that was medium in magnitude between the two belief types. Defeatist performance beliefs demonstrated a significant and medium-sized association with negative symptoms, while self-efficacy beliefs evidenced a small but significant association with negative symptoms. As hypothesized, defeatist performance beliefs were more strongly related to negative symptoms than self-efficacy beliefs.

Our findings indicate that defeatist performance and self-efficacy beliefs are overlapping, yet distinct constructs. Specifically, the magnitude of the association between these two beliefs indicates that only 9.61% of the underlying variance in these constructs is shared, suggesting that over 90% of the variance is unique to each construct. Accordingly, these beliefs may be thought of as independent treatment targets. Further, the magnitude of the correlation is consistent with Ventura et al. (2014), who also found a medium-sized association between more task specific self-efficacy and defeatist performance beliefs in people with early psychosis. However, based on the theoretical similarities between defeatist performance beliefs and generalized self-efficacy, one might have expected a stronger correlation in the current study; this was likely not observed for several reasons. First, several of the items on the self-efficacy scale reference novel or unexpected events, whereas items on the defeatist performance belief scale mostly focus on more general experiences such as doing well or asking a question. Given the uncertainty surrounding novel or unexpected events, it is likely that a person may have divergent beliefs

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about their ability to perform more general experiences compared to novel, unknown experiences. In addition, 14 of the 15 items on the defeatist performance beliefs scale are negatively phrased, while all the items on the self-efficacy scale are positively phrased. Some studies have found differential response patterns to positively and negatively worded items (DiStefano and Motl, 2009; Lindwall et al., 2012). For example, one study found that students were more likely to strongly agree with positively phrased items than to strongly disagree with negatively phrased items (Weems et al., 2010). Other studies have found that personality traits such as neuroticism are associated with a greater likelihood of endorsing negatively worded items (Quilty et al., 2006). It will be helpful for future research to determine whether people, including those on the schizophrenia-spectrum, have differential responses to these belief items when they are positively or negatively phrased.

Consistent with the cognitive model of negative symptoms, our findings suggest that greater dysfunctional beliefs (i.e., increased defeatist performance and reduced self-efficacy beliefs) are related to increased negative symptoms. Notably, these findings build on prior studies that have found associations between these two beliefs and negative symptoms in people with a diagnosis of a schizophrenia-spectrum disorder (cf., Horan et al., 2010; Avery et al., 2009). Further, the current findings, along with prior studies by Fervaha et al. (2014), Luther et al. (2016), and Wolfradt et al. (1999), extend the associations between both defeatist performance and self-efficacy beliefs and negative symptoms to a non-clinical sample. Importantly, this suggests that these associations are not reducible to effects associated with a schizophrenia diagnosis, such as stigma and antipsychotic medication effects. Similarly, it suggests that these beliefs also contribute to negative symptoms even among healthy samples. Additionally, we also found that each belief type was uniquely associated with negative

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symptoms as the relationship between defeatist performance beliefs and negative symptoms remained significant after controlling for self-efficacy beliefs (and vice versa); this further indicates that these beliefs may be independent constructs and treatment targets, particularly for negative symptoms.

Importantly, while our findings indicate that these beliefs may be distinct treatment targets, they also suggest that defeatist performance beliefs may be a more effective target for negative symptoms. Indeed, we observed a significantly stronger relationship between defeatist performance beliefs and negative symptoms than with self-efficacy beliefs. Moreover, the stronger association between defeatist performance beliefs and negative symptoms remained even when controlling for depression symptoms. This suggests that independent of depression symptoms, negative beliefs about one's ability to perform tasks contribute to negative symptoms to a greater extent than confidence in one's ability to effectively complete or respond to new or challenging tasks and situations. These findings are in accord with the cognitive content-specificity hypothesis (Beck, 1976) and suggest that defeatist performance beliefs have greater specificity for negative symptoms than self-efficacy beliefs. Further supporting the key role of defeatist performance beliefs in negative symptoms, we also found that self-efficacy's effect on negative symptoms was mediated by defeatist performance beliefs. In other words, defeatist performance beliefs serve as an intermediary link that helps to explain how reduced self-efficacy leads to increased negative symptoms. Although longitudinal studies are needed to confirm these potential causal links, overall these findings point to defeatist performance beliefs in particular as a key mechanism and treatment target for reducing negative symptoms. Notably, these findings also support the validity of the cognitive model, and specifically the role the model places on defeatist performance beliefs in negative symptoms. Taken together, these results suggest that

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targeting defeatist performance beliefs in psychosocial treatments may lead to greater reductions in negative symptoms than targeting self-efficacy beliefs. Future research may more decisively test this by examining the differential impact on negative symptoms when independently targeting defeatist performance beliefs and self-efficacy beliefs using cognitive therapy approaches (cf., Granholm et al., 2016; Grant et al., 2012).

We also explored whether one belief type was more strongly related to additional schizophrenia-spectrum symptoms as well as depression and subjective quality of life. Both increased defeatist performance beliefs and lower self-efficacy beliefs were significantly associated with greater positive, disorganized, and depression symptoms, and reduced quality of life. Importantly, the relationships between these symptoms were significantly stronger for defeatist performance beliefs than for self-efficacy beliefs. However, the magnitude of the correlations did not differ for quality of life. This may suggest that while both beliefs similarly contribute to quality of life, defeatist performance beliefs have greater specificity for these symptoms. Indeed, theories of self-efficacy largely describe these beliefs as more proximal predictors of task completion or behaviors relevant to quality of life (Bandura, 1977, 1997; Luszczynska, Scholz, et al., 2005), whereas the cognitive model places greater emphasis on the role that defeatist performance beliefs have on symptoms (Beck et al., 2009). Thus, our results suggest that in addition to improving negative symptoms, targeting defeatist performance beliefs (to a greater extent than self-efficacy beliefs) may help to improve positive, disorganized, and depression symptoms. Further, targeting both beliefs may lead to improvements in quality of life. Indeed, this is consistent with findings that targeting defeatist beliefs with cognitive therapy approaches can not only reduce negative symptoms but also reduce positive symptoms and

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improve functioning and life satisfaction among people with schizophrenia (Granholm et al., 2013, 2014; Grant et al., 2012).

A final aim of our study was to ascertain whether these beliefs were altered in those with schizotypy compared to those without schizotypy. Consistent with the cognitive model and our hypothesis, we found that defeatist performance beliefs were increased and self-efficacy beliefs were reduced in those with schizotypy compared to those without schizotypy, with both evidencing large effect sizes. These findings replicate the results of prior work demonstrating that defeatist performance beliefs were also increased among people with schizotypy that completed study measures in a laboratory setting (Luther et al., 2016). Further, our results extend prior work demonstrating that self-efficacy is reduced in people with a schizophrenia-spectrum diagnosis (Lincoln et al., 2014; Ventura et al., 2014) by identifying that these beliefs are also reduced in people with a putative liability for schizophrenia. These findings suggest that alterations in these beliefs develop prior to a formal diagnosis (rather than in response to the diagnosis) and are present in those even on the higher end of functioning on the schizophrenia-spectrum. Taken together with studies that have found that both of these beliefs are impaired in people with early (Ventura et al., 2014) and prolonged psychosis (Grant and Beck, 2009; Lincoln et al., 2014), these beliefs may represent enduring aspects of the schizophrenia-spectrum. Thus, both beliefs may be important to screen for and target in early intervention services. However, because the effect size was relatively larger for defeatist performance beliefs and these beliefs were more strongly associated with schizophrenia-spectrum symptoms, defeatist performance beliefs may be a more primary target compared to self-efficacy beliefs.

Although a strength of this study was the sample size, the sample was recruited from a single university, which may limit the generalizability of these findings. Additionally, the cross-

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sectional nature of this study limits our ability to identify the direction or causal nature of the observed relationships. Further, although we used infrequency items to reduce random and invalid responses, this study was based on self-report measures that were completed online. It will be important for future research to replicate and extend these findings using laboratory-based assessments. In addition, while this study was conducted in a non-clinical setting, future studies should also screen for mental health disorders and consider contextual factors that might impact university students' responses and symptom levels (e.g., point in semester, course load). Finally, our investigation focused on overall negative symptoms and on one belief subtype specified in the cognitive model of negative symptoms; future research is needed to examine the content specificity of other dysfunctional beliefs described in the model, such as low expectancies for success (Beck et al., 2009), for overall and specific negative symptoms (e.g., alogia, anhedonia).

In summary, this study adds additional support for the cognitive model of negative symptoms and also highlights the increased specificity defeatist performance beliefs have for negative symptoms compared to self-efficacy beliefs. In a sample from a non-clinical setting, we found that defeatist performance beliefs were distinct, yet overlapped with self-efficacy beliefs and were more strongly correlated with negative symptoms (as well as positive, disorganized, and depression symptoms) than self-efficacy beliefs. Both increased defeatist performance and reduced self-efficacy beliefs also demonstrated similar relationships with reduced subjective quality of life. In line with the cognitive model, these findings suggest that even at the subclinical level, increased defeatist thinking is associated with increased negative symptomology and reductions in quality of life. Further, we also found that those with schizotypy evidenced relatively larger deficits in defeatist performance beliefs compared to self-efficacy beliefs. Taken

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together, these findings point to defeatist performance beliefs as a uniquely promising treatment target for efforts to reduce or prevent the development of more severe schizophrenia symptomology, particularly negative symptoms.

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Table 1

Means and Standard Deviations for Demographic Characteristics and Study Measures (n = 941)

	%	*N*
Gender (% female)	78.5	739
Ethnicity (% Caucasian)	77.0	725
	M	SD
Age	20.0	3.7
SPQ-BR – Negative	15.1	4.8
SPQ-BR – Positive	33.7	9.0
SPQ-BR – Disorganized	23.8	6.1
Defeatist Performance Beliefs	44.6	14.6
Self-Efficacy Beliefs	30.5	4.1
PHQ-9 – Depression[a]	7.8	5.8
LEH – QOL – Subjective	4.8	0.8

Note. SPQ-BR = Schizotypal Personality Questionnaire-Brief Revised; LEH – QOL = Lehman's Quality of Life Measure; PHQ-9 =9-item Patient Health Questionnaire.

[a] n = 918.

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Table 2

Correlations with defeatist performance and self-efficacy beliefs (*n* = 941)

	Defeatist Performance Beliefs	Self-Efficacy Beliefs	Statistical Difference (*Z*)
SPQ-BR – Negative	**0.43****	**-0.26****	**4.20*****
SPQ-BR – Negative (controlling for depression)[a, b]	**0.33****	**-0.16****	**3.88*****
SPQ-BR – Positive	**0.38****	**-0.16****	**5.17*****
SPQ-BR – Disorganized	**0.28****	**-0.12****	**3.62*****
PHQ-9 – Depression[b]	**0.40****	**-0.30****	**2.44***
LEH – QOL – Subjective	**-0.38****	**0.35****	**0.75**

***Note*. SPQ-BR = Schizotypal Personality Questionnaire-Brief Revised; LEH – QOL = Lehman's Quality of Life Measure; PHQ-9 = 9-item Patient Health Questionnaire.**
*** $p < 0.05$, ** $p < 0.003$ or Bonferroni-corrected significance value for correlations, *** $p < 0.001$**
[a] Partial correlation.
[b] $n = 918$.

Table 3

Mediation analysis model coefficients (*n* = 941)

Antecedent		Consequent						
		Defeatist Performance Beliefs				Negative Symptoms		
		Coefficient	*SE*	*p*		Coefficient	*SE*	*p*
Self-Efficacy Beliefs	*a*	-1.09	.11	< .001	*c'*	-.16	.04	< .001
Defeatist Performance Beliefs	–	–	–	–	*b*	.13	.01	< .001
Constant	i_1	77.85	3.36	< .001	i_2	14.16	1.31	< .001
		$R^2 = .10$				$R^2 = .20$		
		$F(1,939) = 99.71$, $p < .001$				$F(2,938) = 118.83$, $p < .001$		

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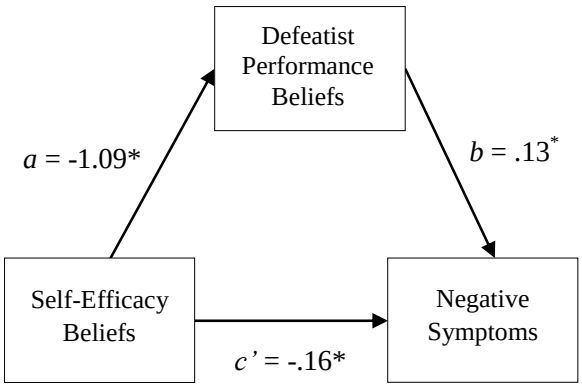
Figure 1. Defeatist performance beliefs as a mediator between self-efficacy beliefs and negative symptoms. * $p < .001$.



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